REMARKS

Claims 1-4, 6-11, 51-55, 56-60 and 62-66 are pending in the application. Claims 1, 6, 52, and 57 have been amended. Applicant gratefully acknowledges the allowance of claim 51.

Claims 1, 4, 52, 55, 62 and 65 stand rejected under 35 U.S.C. §102(b) as anticipated by U.S. Patent 6,072,527 to Iwai ("Iwai"). The rejection is respectfully traversed.

Independent claim 1 recites, *inter alia*, "a pixel array circuit that outputs an image signal and a background signal caused by at least one of non-uniformity of illumination and optical shading, where the optical shading occurs during the collection of light."

Independent claim 52 recites, *inter alia*, "a pixel array circuit for outputting an image signal including a background only signal caused by non-uniformity of illumination."

The invention claimed in independent claims 1 and 52, respectively, relates to an imaging device and an imaging system each having a memory array circuit and a data subtraction circuit. The memory array circuit stores a background signal, separate from the image signal, caused by at least one of non-uniformity of illumination and optical shading. The stored background signal is subtracted from the image signal, captured by the pixel array, in the subtraction circuit. Optical shading may occur when shading of portions of the image occurs because of the influence of the optics on the image data, while non-uniformity of illumination may occur from illumination of a scene being imaged.

In the invention of Iwai, black reference noise is removed from the video stream. The black reference noise data is collected from a portion of the CCD imager that collects data when "no light is incident on the CCD." *See* Iwai col. 6, ln. 26-44. The section of the CCD imager which generates the noise signals is blocked from receiving light. *See* Iwai Fig. 7. Accordingly, the dark

shading signal of Iwai does not relate to noise caused by the non-uniformity of illumination or optical shading. The claims have been amended to clarify this difference.

Iwai fails to teach "a pixel array circuit that outputs an image signal and a background signal caused by at least one of non-uniformity of illumination and optical shading, where the optical shading occurs during the collection of light," as recited in independent claim 1 and "a pixel array circuit for outputting an image signal including a non-uniformity of illumination," as recited in independent claim 52.

Claim 55 depends from claim 52 and is allowable for at least the reasons discussed above. Claim 65 also depends from claim 52 and is allowable for at least the reasons discussed above. Claims 4 and 62 depend from independent claim 1 are allowable for at least the reasons discussed above. Accordingly, Applicant respectfully requests withdrawal of the rejection.

Claims 1, 52, 62-65 stand rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent 6,763,142 to Dai et al. ("Dai"). The rejection is respectfully traversed.

Independent claim 1 recites "a pixel array circuit that outputs an image signal including a background signal caused by at least one of non-uniformity of illumination and optical shading; a memory array circuit, coupled to said pixel array circuit, to store the background signal; and a data subtraction circuit, coupled to said memory array circuit and said pixel array circuit, said data subtraction circuit performing a data subtraction operation on the pixel array output to remove said background signal from said image signal … wherein the background signal is not filtered before it is subtracted from the image signal."

Independent claim 52 recites "a pixel array circuit for outputting an image signal including a background only signal caused a non-uniformity of illumination; a memory array circuit, coupled to

said pixel array circuit, for receiving and storing the background only signal; and a data subtraction circuit, coupled to said memory array circuit and said pixel array circuit for performing a data subtraction to remove said background only signal from said image signal using said stored background only signal ... wherein the background only signal is not filtered before it is subtracted from the image signal."

Dai relates to a system and method for removing noise. Dai captures a reference image of a flat field, a smooth surface or another suitable portion of the target and a target image. The reference image is then processed using Fast Fourier Transforms (FFT) to determine what filter to apply to the reference image. After the filter is applied to the reference image, the resulting signal is subtracted from the target image. Accordingly, the signal which is output from the CCD imager is not subtracted from the image signal (*i.e.*, target signal) but is processed (FFT and filtered) and the filtered image is subtracted from the image signal. In the invention claimed in independent claims 1 and 52, the background signal stored in the memory array circuit is subtracted from the image signal output from the pixel array. Accordingly, Dai fails to teach "a pixel array circuit that outputs an image signal including a background signal...a data subtraction circuit, coupled to said memory array circuit and said pixel array circuit, said data subtraction circuit performing a data subtraction operation on the pixel array output to remove said background signal from said image signal ... wherein the background signal is not filtered before it is subtracted from the image signal," as recited in independent claim 1 and "pixel array circuit for outputting an image signal including a background only signal caused a non-uniformity of illumination; a memory array circuit, coupled to said pixel array circuit, for receiving and storing the background only signal; and a data subtraction circuit, coupled to said memory array circuit and said pixel array circuit for performing a data

subtraction to remove said background only signal from said image signal using said stored background only signal ... wherein the background only signal is not filtered before it is subtracted from the image signal," as recited in independent claim 52. Claims 62-65 depend from claims 1 and 52 and are allowable for at least the reasons mentioned above. Therefore, Applicant respectfully requests withdrawal of the rejection.

Claims 2-3, 6-11, 53-54, 57-59 and 66 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Iwai in view of U.S. Patent 5,734,152 to Goren et al. ("Goren"). The rejection is respectfully traversed.[1]

Independent claim 6 recites, *inter alia*, "receiving analog image data, said analog image data including a background signal, caused by at least one of non-uniformity of illumination and optical shading, where the optical shading occurs during the collection of light, and a temporal signal."

Independent claim 57 recites, *inter alia*, "a pixel array circuit, formed in said substrate, for providing an image signal and a background signal caused by at least one of non-uniformity of illumination and optical shading, where the optical shading occurs during the collection of light."

As discussed above in greater detail, Iwai teaches collecting black reference noise data from a portion of the CCD imager that collects data when "no light is incident on the CCD." *See* Iwai col. 6, ln. 26-44. The dark shading signal of Iwai does not relate to noise caused by the non-uniformity of illumination or optical shading.

Goren relates to optical scanners and processors for the same and specifically describes an enhancement filter. However, Goren fails discuss a pixel signal having a background signal and

[1] Applicant notes that the rejection of independent claims 6 and 57 are premised on the discussion of the rejection of claim 1 under Iwai and Goren in combination, however, claim 1 was not rejected over the combination of Iwai and Goren.

thus, fails to make up the inadequacies of Iwai. Accordingly, Iwai and Goren, whether considered alone or in combination, fail to teach or suggest "receiving analog image data, said analog image data including a background signal, caused by at least one of non-uniformity of illumination and optical shading, where the optical shading occurs during the collection of light, and a temporal signal," as recited in independent claim 6 and "a pixel array circuit, formed in said substrate, for providing an image signal and a background signal caused by at least one of non-uniformity of illumination and optical shading, where the optical shading occurs during the collection of light," as recited in independent claim 57. Accordingly, Applicant respectfully requests withdrawal of the rejection.

Claims 2-3, 53-53, 58-59 and 66 respectfully depend from independent claims 1, 52 and 57 and are allowable for at least the reasons discussed above with respect to independent claims 1, 52 and 57. Accordingly, Applicant respectfully requests withdrawal of the rejection.

In view of the above, Applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

By _____

Thomas J. D'Amico
Registration No.: 28,371
Amanda S. Pitcher
Registration No.: 54,374
DICKSTEIN SHAPIRO LLP
1825 Eye Street, NW
Washington, DC 20006-5403
(202) 420-2200
Attorneys for Applicant